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Docket No.: GR 98 P 3112

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#18

By: ______________________ Date: March 3, 2003

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
Before the Board of Patent Appeals and Interferences

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Applicant : Johann Meseth

Applic. No.: 09/655,091

Filed : September 5, 2000

Title : Containment Vessel and Method of Operating a Condenser in a Nuclear Power Plant

Examiner : Jack Keith - Art Unit: 3641

BRIEF ON APPEAL

Hon. Commissioner of Patents and Trademarks,
Washington, D. C. 20231,

S i r :

This is an appeal from the final rejection in the Office action dated August 1, 2002, finally rejecting claims 1-8.

Appellants submit this *Brief on Appeal* in triplicate, including payment in the amount of $320.00 to cover the fee for filing the *Brief on Appeal*.

03/10/2003 AWONDAF1 00000026 09655091
01 FC:1402 320.00 OP

Real Party in Interest:

This application is assigned to Siemens Aktiengesellschaft of München, Germany. The assignment will be submitted for recordation upon the termination of this appeal.

Related Appeals and Interferences:

No related appeals or interference proceedings are currently pending which would directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

Status of Claims:

Claims 1-8 are rejected and are under appeal. Claims 9-14 are withdrawn from consideration.

Status of Amendments:

No claims were amended after the final Office action. *A Response under 37 CFR § 1.116* was filed on December 2, 2002.

Summary of the Invention:

As stated in the first paragraph on page 1 of the specification of the instant application, the invention relates to a containment vessel of a nuclear power plant, having a condensing chamber, a pressure chamber and a condenser disposed in a top region of the pressure chamber.

The invention also relates to a method of operating a condenser in a nuclear power plant.

Appellant explained on page 12 of the specification, line 17, that, referring in detail to the single figure of the drawing, there is seen a reactor pressure vessel 2 which is disposed centrally in a closed containment vessel 1, that is also merely referred to as a containment. A condensing chamber 4 and a flood basin 8 disposed above it are provided laterally next to the reactor pressure vessel 2, as further built-in components in the containment vessel 1. The flood basin 8 is open at the top toward an interior space of the containment vessel 1. The interior space is also designated as a pressure chamber 6. The latter forms a common pressure space with the flood basin 8.

Appellant outlined on page 13 of the specification, line 4, that the condensing chamber 4 and the flood basin 8 are each partly filled with a cooling liquid f, in particular water, up to a filling level n. The maximum filling level n in the flood basin 8 is determined by a top end of an overflow pipe 10. The overflow pipe 10 connects the flood basin 8 to the condensing chamber 4 and discharges into the cooling liquid f of the condensing chamber 4. If the maximum filling level n is exceeded, the cooling liquid f flows off from the flood

basin 8 into the condensing chamber 4. Furthermore, the flood basin 8 is connected through a flood line 12 to the reactor pressure vessel 2 and can supply the latter with sufficient cooling liquid f in an emergency.

It is stated in the last paragraph on page 13 of the specification, line 17 that the condensing chamber 4 is largely closed off from the pressure chamber 6. It is merely connected to the pressure chamber 6 through a condensing pipe 14. The condensing pipe 14 is immersed in the cooling liquid f of the condensing chamber 4, so that no gas exchange takes place between the condensing chamber 4 and the pressure chamber 6. The condensing pipe 14 is closed by a water plug 15, which is formed by a water column in the condensing pipe 14. Steam only flows into the condensing chamber 4 through the condensing pipe 14 for condensing in the event of an accident, if the pressure in the pressure chamber 6 increases.

Appellant described on page 14 of the specification, line 4, that a condenser 16, which is designated as a building condenser, is disposed in a top region of the containment vessel 1 and thus in a top region of the pressure chamber 6, in the left-hand half of the figure. The condenser 16 is constructed as a heat exchanger with heat-exchanger tubes and

is fluidically connected to a cooling basin 18. In principle, the condenser 16 may also be disposed outside the containment vessel 1 in this cooling basin 18 and may be connected through pipelines to the interior space of the containment vessel, in particular to the pressure chamber 6. The cooling basin 18 is disposed outside the containment vessel 1 on a cover 20 thereof. The condenser 16 absorbs heat from its surroundings inside the containment vessel 1 and transfers it to the cooling basin 18. As a result, heat can be dissipated from the containment vessel 1 to the external surroundings.

It is further outlined on page 14 of the specification, line 20, that a drain pipe 22 is preferably disposed in the region of the condenser 16. It is important that its top end 24 is disposed in the top region of the pressure chamber 6 and in particular at a level above the condenser 16. Its bottom end 26 discharges into the cooling liquid f of the condensing chamber 4. The drain pipe 22 is constructed as a simple pipe which is free of built-in components and forms an open flow path from the pressure chamber 6 into the cooling liquid f of the condensing chamber 4. In this case, "free of built-in components" means that no valves or other fittings or components are connected in the flow path.

Appellant stated in the second paragraph on page 15 of the specification, starting at line 6, that, in this case, the immersion depth of the drain pipe 22 in the cooling liquid f is smaller than that of the overflow pipe 10 and that of the condensing pipe 14, which has a substantially larger cross-sectional area than the drain pipe 22. The bottom end 26 of the drain pipe 22 is therefore disposed above respective outlet orifices 28 of the condensing pipe 14 and the overflow pipe 10.

It is further stated on page 15 of the specification, starting at line 14, that, in the event of an accident, for example in the event of a fracture in a steam line in the containment vessel 1 and an escape of steam associated therewith, the temperature and the pressure in the containment vessel 1 increase. Various emergency cooling devices, of which only the condenser 16 and the flood basin 8 with the associated flood line 12 are shown in the figure, ensure that the final pressure in the event of an accident in the containment vessel 1 does not exceed an admissible limit value. This is primarily achieved by cooling and condensing of the steam. An important factor in this case is the condenser 16, with which heat can be dissipated to the outside from the containment vessel 1.

Appellant explained on page 16 of the specification, line 1, that, in the course of an accident, noncondensible gases, in particular hydrogen, will possibly be released, and these noncondensible gases accumulate in the top region of the containment vessel 1, i.e. in the top region of the pressure chamber 6. The noncondensible gases which collect in the top region of the pressure chamber 6 lead to an increase in the pressure in the containment vessel 1. Due to the configuration of the drain pipe 22 and the increased pressure in the region of the top end 24, the mixture of steam and noncondensible gases there flows off through the drain pipe 22 from the top region of the pressure chamber 6 into the condensing chamber 4. The entrained steam is condensed in the condensing chamber 4. Therefore, by virtue of the drain pipe 22, an accumulation of noncondensible gases, for which the entire gas space in the condensing chamber 4 is available, is avoided in the region around the condenser 16.

It is explained in the last paragraph on page 16 of the specification, line 18, that, in principle, the noncondensible gases impair the efficiency of the condenser 16 by virtue of the fact that they substantially reduce the heat exchange capacity of the condenser 16. When noncondensible gases are present, substantially less heat per unit of time and per unit of area can be dissipated from the

steam to the cooling basin 18 by the heat exchanger 16 than when noncondensible gases are absent. Since the latter are drawn off from the surroundings of the condenser 16, the condenser 16 can be constructed for saturated steam. The condenser 16 therefore does not need to have any large and specially constructed heat-exchange areas, which would be absolutely necessary if noncondensible gases were present in order to be able to dissipate sufficient heat. The condenser 16 may therefore have a simple, compact and thus cost-effective construction.

Appellant described on page 17 of the specification, line 8, that, due to the smaller immersion depth of the drain pipe 22 as compared with that of the condensing pipe 14, steam will flow out of the pressure chamber 6 into the condensing chamber 4 solely through the drain pipe 22 as long as there is only a low positive pressure in the pressure chamber 6 relative to the pressure in the condensing chamber 4. Steam can only flow through the condensing pipe 14 into the condensing chamber 4 at greater pressure differences between the pressure chamber 6 and the condensing chamber 4, which only occur briefly in exceptional cases. The condensing pipe 14 has a large cross section of flow and therefore enables very large steam quantities to be directed for condensing into the condensing chamber 4 in the shortest possible time.

It is outlined in the last paragraph of the specification, beginning at line 22 on page 17, that, according to the present novel concept, in a containment vessel 1 with a condenser 16, noncondensible gases are automatically drawn off from the active region of the condenser 16 into the condensing chamber 4 through a flow path. In this case, the flow path is formed by a simple drain pipe 22. The mode of operation of the drain pipe 22 is purely passive, thus no external control actions are necessary. The drain pipe 22 also requires no movable components and is therefore maintenance-free. The reliability of performance of the condenser 16 is ensured by the configuration of the drain pipe 22, so that the condenser 16 may have a simple structure.

<u>References Cited</u>:

European Patent Application Publication No. 0 620 560 A1 (Gluntz et al.), dated October 19, 1994;

Japanese Patent Application Publication No. JP 05-196776 A (Shirochika), dated August 6, 1993;

Japanese Patent Application Publication No. JP 62-108939 A (Ishimoto), dated May 20, 1987;

U.S. Patent No. 6,069,930 (Gamble et al.), dated May 30, 2000.

Issues

1. Whether or not claims 1, 3, 5 and 7 are obvious over Gluntz et al. in view of either Shirochika or Ishimoto under 35 U.S.C. §103(a).

2. Whether or not claims 2, 4, 6 and 8 are obvious over Gamble et al. in view of either Shirochika or Ishimoto under 35 U.S.C. §103(a).

Grouping of Claims:

Claims 1-2 are independent. Claims 3, 5 and 7 depend on claim 1. Claims 4, 6 and 8 depend on claim 2. The patentability of claims 1 and 2 are separately argued. Therefore, claims 3, 5 and 7 stand or fall with claim 1 and claims 4, 6 and 8 stand or fall with claim 2.

Arguments:

In item 3 on pages 2-3 of the above-mentioned final Office action dated August 1, 2002, claims 1, 3, 5 and 7 have been rejected as being unpatentable over Gluntz et al. in view of Shirochika or Ishimoto under 35 U.S.C. § 103(a).

Before discussing the prior art in detail, it is believed that a brief review of the invention as claimed, would be helpful.

Claim 1 calls for, inter alia:

> a condenser communicating with said pressure chamber through a flow path;
>
> a condensing pipe leading into said condensing chamber; and
>
> a drain pipe for noncondensible gases, said drain pipe disposed in said interior space and fluidically connecting said top region of said pressure chamber to said condensing chamber, said drain pipe defining a direct connection to said condensing chamber, and said drain pipe not connected to said condenser.

The basic concept in the system according to Gluntz et al. completely differs from the concept of the invention of the instant application. The object of the invention of the instant application is to remove the gases which may possibly arise within the containment in case of an accident and which are not condensable, from the inside of the containment, independently of the steam and thus via an independent branch line. According to the invention of the instant application, the drain pipe (22) is provided for this purpose, which, in case of a design basis accident, leads the condensable gases from the interior into the condensing chamber (4). In contrast, the steam that appears in case of a design basis accident is not led off via the drain pipe (22) but rather

condensed by the condenser (16) so that the water initially collects in the flood basin (8). The condensed steam reaches into the condensing chamber (4) via pipes connected downstream of the flood basin. As a whole, the result is a medium-dependent parallel connection of the flow guide for the non-condensable gases, on the one hand, and the condensable steam on the other hand. This medium-dependent parallel connection enables a particularly targeted treatment of the different media.

In contrast to the invention of the instant application, the system according to Gluntz et al. provides a single common flow path for both media, i.e. for the non-condensable gases as well as for the condensable steam. In this system, the non-condensable gases are guided via the inlet 60 together with the condensable steam via the condenser 54 and initially cooled. Both parts are only thereafter fed to the collector 64, from where a draining into the respective condensing chambers takes place. A separate and thus targeted influence of the individual flows of medium is not possible with this flow path.

The component 64 in Gluntz et al. is not a condenser but rather a collector for the media which drain from the condenser 54. A person skilled in the art can only gather

from Gluntz et al. that in the system where the condenser 54 is located outside of the actual containment, a collector 64 for a medium which drains from the condenser 54 can be provided within the containment. A person skilled in the art would not consider any knowledge from the field of heat exchangers or condensers in combination with the collector 64 in the system according to Gluntz et al. and would therefore not use concepts from condenser construction in the pipe conduit for the connections of the collector 64.

Additionally, the modification of the connection of the collector 64 as assumed by the Examiner would change its basic and function-indicating switching in the entire flow path. It cannot be seen that such a change, especially in view of safety demands, would even be admissible or suitable in the power plant.

Even in the most unlikely or actually not understandable case that a person skilled in the art would actually guide the pipe 66 of Gluntz et al. independently of the collector 64, he or she would still not obtain a system according to the invention of the instant application. Even if the pipe 66 were guided independently of the collector 64, it cannot be underestimated that the condenser 54 in the system according

to Gluntz et al. is still located outside of the containment, and that the component 64 is the actual collector.

The Examiner has stated that it is well known for the drain pipe (22) not to be directly connected to the condenser (see the last paragraph on page 3 of the Office action). However, the Examiner's example concerns the concept of draining the condensate from the surrounding of the condenser. In contrast, the drain pipe (22) according to the invention of the instant application is used for leading the non-condensable gases and thus that mixed part which no longer contains the condensate formed therein. In contrast to the Examiner's example, in which the collector for collecting the condensate and the pipes must be disposed below the condenser, the drain pipe according to the invention of the instant application is disposed in the same space region as the condenser or even preferably disposed with its top end above the condenser.

It is accordingly believed to be clear that none of the references, whether taken alone or in any combination, either show or suggest the features of claim 1. Claim 1 is, therefore, believed to be patentable over the art and since claims 3, 5 and 7 are ultimately dependent on claim 1, they are believed to be patentable as well.

In item 4 on pages 4-5 of the above-mentioned Office action, claims 2, 4, 6 and 8 have been rejected as being unpatentable over Gamble et al. in view of Shirochika or Ishimoto under 35 U.S.C. § 103(a).

Before discussing the prior art in detail, it is believed that a brief review of the invention as claimed, would be helpful.

Claim 2 calls for, inter alia:

> a condenser disposed in said pressure chamber and defining a region around said condenser;
>
> a condensing pipe leading into said condensing chamber; and
>
> a drain pipe for noncondensible gases, said drain pipe fluidically connecting said region around said condenser to said condensing chamber, and said drain pipe having a top end disposed above said condenser, and said drain pipe defining a direct connection to said condensing chamber, and said drain pipe not connected to said condenser.

As discussed above, an important feature of the invention of the instant application is a medium-dependent parallel connection of the flow guide for the non-condensable gases, on the one hand, and the condensable steam on the other hand. This medium-dependent parallel connection enables a particularly targeted treatment of different media. This feature is not disclosed in any of the cited references.

In Gamble et al., the procedures for handling of the non-condensable gases and condensable steam are not separated. In addition, Gamble et al. do not disclose "said drain pipe having a top end disposed above said condenser", as recited in claim 2 of the instant application.

As recited in claim 2 of the instant application, the condenser is disposed in the pressure chamber (6). This feature is not disclosed in any of the cited references. Gamble et al. explicitly states that the condenser is located outside containment drywell 72 (see column 4, line 42).

The positioning of the condenser in the pressure chamber or outside the pressure chamber is not a trivial unimportant measure but determines the overall safety and the overall construction of the nuclear plant. The position of the condenser (in the pressure chamber or outside the pressure chamber) will affect the important construction parameters such as routing, dimensioning, etc. Due to the different resulting flow ratios, a technology transfer between the two positions or an exchange of further components such as flood basin or the individual routing is not possible.

It is accordingly believed to be clear that none of the references, whether taken alone or in any combination, either show or suggest the features of claim 2. Claim 2 is, therefore, believed to be patentable over the art and since claims 4, 6 and 8 are ultimately dependent on claim 2, they are believed to be patentable as well.

In view of the foregoing, reconsideration and allowance of claims 1-8 are solicited.

The honorable Board is therefore respectfully urged to reverse the final rejection of the Primary Examiner.

Respectfully submitted,

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For Appellants

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